

Stern Review
2/35
HM Treasury
1 Horse Guards Road
London SW1 2HQ
16/03/05

Dear Sir

I enclose a memorandum to the Stern Review on the Economics of Climate Change from Lyondell.

INTRODUCTION

Lyondell is one of the world's largest chemical companies with 2005 revenues in excess of 18 billion U.S. dollars and manufacturing assets in all three principal regions of the world. Employees number around 10,000. Lyondell is also the largest merchant producer of fuel ethers for use as clean motor gasoline (petrol) components, including bio-ETBE (ethyl tertiary butyl ether) produced from renewable bio-ethanol feedstock. Lyondell's assets include a manufacturing facility at Stallingborough, Lincolnshire and a management office in Maidenhead, Berkshire.

As a recognized leader in the field of clean transport fuels, Lyondell has advised extensively on the use of fuel ethers in gasoline to minimize harmful emissions, while extending tight supplies of finished gasoline. Since the Company's initial production of fuel ethers in the 1970's, Lyondell technologists have provided support and consultation to governmental authorities on transport fuel emission reductions and, more recently, on biofuel regulation. Lyondell is a member of the European Fuel Oxygenates Association, a CEFIC sub-group, and is also a member of the U.K. Environmental Industries Commission.

SUMMARY

This memorandum seeks to address aspects of the Stern Review which relate to transport fuel markets, policy and regulation. Observations are made with respect to:

- the need to accelerate EU market penetration while removing the burden of undesirable constraints
- the uneven and uncoordinated development of transport biofuels across the EU
- the UK Government's proposals to introduce a flexible obligation scheme (RTFO) for biofuels implementation

BIO-ETBE

a) Overview

Bio-ETBE is a gasoline component produced from renewable bio-ethanol and isobutylene. Bio-ethanol constitutes 47 per cent by volume of bio-ETBE, and is typically



derived from fermentation and distillation of sugar or cereal crops. The other (isobutylene) portion of the product is commonly derived from butane sourced from U.K. and other North Sea gas fields, significantly reducing U.K. dependence on crude oil. The European Commission and a number of Member States acknowledge the significant potential contribution that bio-ETBE can make towards carbon reduction, the lowering of crude oil dependence, and support for CAP reform. EU gasoline specifications permit bio-ETBE to be blended into conventional (hydrocarbon) gasoline at levels up to 15 per cent volume (equivalent to 7 per cent volume bio-ethanol equivalent)

Bio-ETBE belongs to a generic group of materials known as fuel ethers, for which European installed capacity amounts to 5.8 million tonnes per year distributed between more than 50 production units located in 22 countries. Complete conversion of this capacity to bio-ethers (predominantly bio-ETBE) can be achieved with minimum investment and short lead-times. During 2005, EU ETBE production grew to 1.1 million tonnes (19 per cent of EU fuel ethers capacity), and consumed more than 75 per cent of all bio-ethanol destined for gasoline consumption.

Lyondell operates worldscale bio-ethers facilities at Rotterdam and Fos-sur-Mer (near Marseille) with bio-ETBE capacities of 600,000 tonnes and 750,000 tonnes respectively. The Company's Fos facility first introduced commercial quantities of bio-ETBE in 1998, and has steeply increased volumes to meet growing demand in Europe

b) benefits

Substantial carbon dioxide emission reductions are achieved by the blending of bio-ETBE with conventional gasoline. They occur principally due to the following:

- The renewable constituency (47 per cent) of the bio-ETBE molecule, which confers carbon neutrality on a "well to wheels" basis. As noted in the above overview, the non-renewable (isobutylene) portion of the molecule can provide complementary benefit through reduced dependence on crude oil.
- Improved combustion in the spark ignition (gasoline) engine resulting from the fuel efficiency and superior anti-knock performance of bio-ETBE.
- Avoidance of high energy intensity refining processes, and their associated emissions of carbon dioxide.

Substantial improvement in air quality is also delivered by bio-ETBE in the form of reduced volatile organic component (VOC) emissions compared with conventional gasoline. VOC's are precursors to the production of low level ozone which, according to recent research, pose a particular danger to children's health.

Bio-ETBE enhances the economic, emissions and overall technical performance of bio-ethanol as a gasoline component. Most significantly, EU gasolines containing bio-ETBE are fully compatible with commodity gasoline distribution systems and automotive components without recourse to special procedures or capital investment.

Current technology for the production of bio-ethers is well established, efficient and reliable. Nevertheless Lyondell believes that there is further scope for improvement in the efficiency of bio-ethanol production and the logistics required for bio-ETBE feedstock

supply. This is likely to materialise initially through the start-up of new EU facilities, and logistics designed to serve international markets. However, more significant progress will depend on the successful development of second generation lignocellulose technology which has yet to reach commercial production.

We strongly support policies which encourage continuous efficiency improvements and competition within a transparent but sustainable free market.

EU MARKET PENETRATION

With few exceptions, EU Member States have so far failed to deliver energy substitution targets set out by the EU Biofuels Directive 2003/30. Superficially, this failure – especially in the gasoline sector – is a consequence of insufficient biofuel capacity and investment. In reality, however, the following factors have been significant contributory factors:-

- A reliable, internationally traded, and transparent bio-ethanol market has yet to be established. This is especially apparent in the EU, and is in marked contrast to the oil and fuel ethers markets with which the bio-ethanol producers must trade. It is vital that a liquid, transparent platform is developed consistent with its commodity environment, and that the basis for bio-ethanol transactions becomes increasingly distanced from risk aversion and outdated agricultural support mechanisms.
- Harmonisation of biofuels policy and regulation has been disappointing, and administrative bureaucracy has obstructed the introduction and free flow of product within and between EU Member States. Notwithstanding the sovereignty associated with specific tax provisions, there is little logic, for example, to the multitude of interpretations applied by national and regional customs authorities with regard to simple matters such as bio-ETBE biomass content, export customs codes and bioethanol denaturation. It is worth noting that German biofuels growth in the gasoline sector has been painfully slow in spite of the application of 65.4 Euros / Hl excise duty relief – the highest of any EU Member State. Successful biofuels market penetration requires coherent policy aligned to uncluttered regulation which is harmonized to encourage participation, and designed to maintain essential product free flow.
- Failure to balance the solutions of today with the promise of the future: Bio-ETBE offers a readily available option to combat climate change and the harmful emissions of atmospheric pollutants. Research directed towards more radical long term solutions should be encouraged through joint co-operation between Government and industry. However, a number of frequently debated carbon reduction technologies are as yet far from commercial development, and will require substantial investment and lead-time. Recent data linking raised carbon dioxide levels to accelerated climate change, and the sensitivity of children's health to low level ozone formation requires the Government to take cost effective action today, rather than speculate disproportionately on dramatic success in the future. Bio-ethers, especially bio-ETBE, can meet a substantial part of the EU Biofuels Directive target of 5.75 per cent energy substitution of

transport fuels by 2010, and should be actively supported by the UK Government.

UK POLICY AND REGULATION

In principle, the U.K. Government's policy of introducing a flexible obligation scheme for the introduction of biofuels is welcomed by Lyondell, and its representative trade association EFOA. The scheme offers incentives for target compliance and sourcing efficiency, while providing environmental and sustainable development safeguards. Lyondell believes that successful implementation of such a scheme requires the following:-

- Equitable treatment of competing biofuel options with regard to tax treatment, and the application of robust methodology for the calculation of carbon emissions and assurance. All direct and indirect contributions to carbon reduction must be taken into account. In this respect, it is worth noting that a number of published papers from leading institutions have failed to deliver complete and accurate representation of bio-ETBE benefits. Lyondell also recommends that policy and regulation should adequately value the reduction in emissions of volatile organic components (VOC's) which occurs as a result of blending bio-ETBE and similar materials to conventional gasoline. The EU CAFE (Clean Air For Europe) programme specifically recognises the need for effective remedial action, while recent research has concluded that low level ozone originating from VOC's is particularly damaging to the health of children. As a first step, gasoline volatility specifications, and the protection that their limits afford against the emission of harmful atmospheric pollution should not be relaxed as a means to support of renewable options which are fundamentally uneconomic.
- Adequate consideration of the need for a combination of RTFO and continued excise duty relief to stimulate introduction and local investment, at least for a significant and defined period. A RTFO only scheme is unlikely to attract local investment, and may run an unacceptable risk of protracted global biofuels shortage as government schemes around the world create clamour for scarce and unreliable biofuel supply.. Lyondell supports the EIC position that a period of "carrot and stick" may be warranted through a joint application of RTFO and excise duty relief.
- Further to RTFO policy, the level and periodic review of the buy-out price is critical. Application of a low buy-out price might protect the public from gasoline price inflation, but would ultimately betray public commitments to combat climate change. Lyondell does not support a policy that allows the oil industry to relinquish public policy on climate change and low level ozone.
- The adoption of existing international standards and methodology for sustainability and carbon assurance, where they exist. Notwithstanding WTO provisions which forbid such schemes which discriminate against imports from developing nations, it is nevertheless important to ensure that EU manufacturing businesses are not subject to disadvantage from rules which are not equitably applied on the international stage.



- EU harmonization of biomass administration and certification in order to allow free product flow and common bases for biomass calculations.

If you would like any clarification on this submission or further information, please contact me (wiebe.schipper@lyondell.com) or my colleague in the UK, Peter Gaines (peter.gaines@lyondell.com)

Yours sincerely

A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Wiebe Schipper

Biofuels Development Manager